

Reflections and Reviews

The Creative Destruction of Decision Research

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The most recent wave of decision research goes beyond the usual critiques of linear probability weighting, exponential discounting, and other specialized assumptions, and challenges some of the most basic assumptions of the decision-making paradigm itself. In response to these challenges, decision researchers have proposed alternative accounts of behavior, some of which bear little resemblance to decision making as it is commonly conceived. I provide an overview of some of the challenges confronting the decision-making paradigm, and I present the broad outline of what I see as an emerging alternative perspective.

It is difficult for economic policy to deal with the abruptness of a break in confidence. There may not be a seamless transition from high to moderate to low confidence on the part of businesses, investors, and consumers. (Testimony of Federal Reserve Board Chairman ALAN GREENSPAN to Congress, February 28, 2001)

Current models of decision making view human behavior as the product of choice. Individuals select actions based on an assessment of self-interest, which, for most consequential decisions, involves an integration of attributes such as probabilities, time delays, and component values. Behavioral decision research has enriched this model by challenging a variety of its implicit and explicit assumptions. Research on judgment has documented numerous systematic biases in human information processing, such as underweighting base rates, overconfidence, hindsight bias, and

misperceptions of random sequences. Research on choice has explored ways in which decision makers violate such stylized assumptions as linear probability weighting, exponential time discounting, and various forms of preferential independence. All of these topics have been studied with a wide variety of methods, including laboratory experiments, field studies, and economics-style market experiments.

Judging from its adoption by scholars from virtually every social science discipline, the decision-making perspective has great intuitive appeal. And, although the behavioral decision research extension of the perspective remains controversial, it has won many new converts, who have created fields such as behavioral economics, behavioral law and economics, behavioral finance, and behavioral marketing. Indeed, by increasing its descriptive realism, behavioral decision research may have won new converts to the decision-making perspective.

Even as behavioral decision research attracts new converts, however, behavioral decision researchers themselves have increasingly voiced doubts about the validity and universal applicability of their own perspective. Responding creatively to these doubts, they have begun to explore alternative accounts of behavior that bear little resemblance to decision making as it is usually conceived. If decision making is about choosing a course of action based on an evaluation of consequences, then much of the most recent research by behavioral decision researchers is not *about* decision making. Ironically, just at the moment when behavioral decision research is making inroads into wide-ranging disciplines, behavioral decision researchers are moving

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on. It is as if the guests have finally arrived at the party to find that the hosts have relocated.

Although the basis for behavioral decision researchers' doubts is diverse, many of the internal critiques of decision theory have focused on the assumption that behavior is deliberative in character. A number of researchers have argued that deliberative, calculated decision making is the exception and that most behavior is relatively automatic (Bargh and Chartrand 1999; Bargh and Gollwitzer 1994; Schneider and Shiffrin 1977; Shiffrin and Schneider 1977), habitual (Louis and Sutton 1991; Ronis, Yates, and Kirscht 1989), mindless (Langer 1989), or rule guided (Anderson 1993; Prelec 1991; Prelec and Herrnstein 1991). My goal in this article is to enumerate some of the reasons why decision researchers are abandoning their own paradigm and, in the course of doing so, to hint at the outlines of an alternative perspective that synthesizes many of these alternative accounts of behavior.

PROBLEMS WITH THE DECISION-MAKING PERSPECTIVE

The decision-making account of human behavior is ancient, probably because it is highly intuitive. Its intuitiveness should not count against it; indeed, intuitiveness is generally a desirable attribute. But there is surprisingly little evidence beyond introspection to support the decision-making account of behavior, and introspection is a notoriously fallible source of insight into the causes of behavior (Nisbett and Wilson 1977). Numerous studies show that people tend to interpret their own behavior as the result of deliberative decision making even when this is not the case (Wegner and Wheatley 1999). For example, in one study involving a split-brain patient whose right hemisphere could interpret language but not speak and whose left hemisphere could speak but not interpret language, the patient's right hemisphere was privately instructed to take a physical action, and the left hemisphere observed the action but was unaware of the instructions that had been given to the right hemisphere. When the patient was asked why he had taken an action, such as waving his hand, the left hemisphere (which could talk) invariably came up with a plausible explanation, such as that the patient thought that he saw someone he knew (Gazzaniga and LeDoux 1978). The brain is a sense-making organ. When it observes its owner behaving in a particular way, it assumes that there was good reason for doing so and interprets behavior in terms that it can understand (Bem 1967). It is unlikely to attribute the organism's behavior to automatic or preconscious processes, such as visual perception, that are not accessible to consciousness.

The Problem of Bounded Rationality

Decision making, as envisioned in the traditional paradigm, would make overwhelming demands on our capacity to process information (e.g., Simon 1955). Even the simplest decisions, expressed in the conventional form of a decision tree, rapidly overwhelm human cognitive capabilities (Gabaix and Laibson 2000). Results from process-tracing re-

search suggest that, when presented with decisions in the form of matrices of alternatives and attributes, people adopt cognitive shortcuts, such as lexicographic choice rules (Payne, Bettman, and Johnson 1993). But there is no evidence that naturalistic decision making resembles such a process, and there is some evidence to the contrary. As Klein (1989, p. 47) concludes from 150 interviews with five different populations of decision makers, "relatively few decisions are made using analytical processes such as generating a variety of options and contrasting their strengths and weaknesses." Indeed, very few of the alternatives that people commonly choose between can easily be broken down into the types of attributes to which such rules apply. That may be why so much research on multiattribute decision making relies on the same few products (e.g., apartments) or uses blatantly artificial attributes such as "beer quality."

The brain consists of specialized modules, and most brain functions are broadly distributed across multiple modules. When the brain is confronted with a new problem, it draws on its existing resources—its specialized modules—selectively in a fashion that is not unlike that of an economy gearing up to produce a new kind of product (Calvin 1996). Through a process that is not yet well understood, the brain becomes progressively more efficient (in terms of using fewer units to better effect) at solving problems that it is exposed to repeatedly (Haier et al. 1992). Presumably the process of allocating the processing power of modules to problems takes into account not only the match of specific modules to specific problems but also the raw processing power of different modules.

Computers are exceptionally good at the types of cognitive operations—for example, addition, subtraction, multiplication, cancellation, and magnitude comparisons—that are featured in research on multiattribute decision making (e.g., Payne et al. 1993). But humans are comparatively much better at other types of information-processing tasks. For example, computers still do not hold a candle to humans when it comes to visual perception, categorization, and pattern matching. It should come as no surprise, then, that experts solve problems and make decisions using these types of processes rather than analytical operations (e.g., Gobet and Simon 1996), and it would be surprising if novices rely on very different processes for most of the routine decisions they make.

Impact of Context

The importance of pattern matching in decision making may help to explain another observation that is difficult to reconcile with conventional decision theory: the powerful impact of contextual factors on decision making (Goldstein and Weber 1995). For example, Hershey, Kunreuther, and Schoemaker (1982) found that the choice between two gambles was substantially affected by whether the decision was expressed as involving gambling, in which case people were risk seeking, or as involving insurance, in which case people were risk averse. Ross and Ward (1996) showed that play in a prisoner's dilemma game was affected dramatically by whether the game was labeled the "Wall Street Game" or

the “Community Game.” Moreover, research on the ultimatum game reveals a similar pattern. In the standard ultimatum game, one side (the “proposer”) proposes an allocation of a fixed amount of money (e.g., \$10), and the other (the “responder”) can either accept the allocation or reject it—in the latter case neither side gets anything. The usual finding is that proposers divide the money evenly, and responders accept this division. But researchers have varied the context rather subtly and have observed striking changes in behavior (see Camerer and Thaler 1995). For example, Blount and Neale (1994) recast the ultimatum game as a situation in which a buyer could accept or reject a seller’s take-it-or-leave-it offer. Probably because people are accustomed to making purchases that do not split any surplus evenly with the seller, in this version of the game highly uneven offers were made and accepted.

Context effects are, of course, not new for decision research, and many violations, such as preference reversals and attraction and compromise effects, may be well-explained by attribute-based consequentialist theories. But the effects just mentioned do not seem to operate by changing people’s weighting of attributes, but instead by influencing their construal of the kind of situation they are in and, hence, the rules of behavior that apply.

Intraindividual Variability

People differ from one another, and a single individual often behaves in a seemingly inconsistent fashion across situations and over time. This lack of intraindividual consistency observed in risk taking (MacCrimmon and Wehrung 1990), intertemporal choice (Frederick, Loewenstein, and O’Donoghue 2001; Fuchs 1982), and interpersonal decision making (Loewenstein 1996a) poses a challenge to attribute-based accounts of decision making. Such models assume that individuals weigh probabilities, time delays, and outcomes experienced by other persons in a consistent fashion, and, hence, predict a high degree of intraindividual consistency, which is not observed.

Again, the reason probably has to do with construal. In the domain of risk, for example, many people are scared by risks that are objectively rather harmless, such as flying or social interactions, but not by risks that are truly hazardous, such as driving or eating fat red meat. People will appear to be inconsistent if you fail to take into account the way that they construe risks—that is, what they find scary—but appear much more consistent if you take into account their perceptions of riskiness (Loewenstein et al. 2001; Weber and Milliman 1997). For intertemporal choice, the same pattern is evident. Most people have some long-term goals that they care a lot about—for example, their health, the welfare of their children, or their academic or political legacy—and are willing to sacrifice for, but also have areas of weakness—for example, sex, drugs, and food—in which they display, at least sometimes, extraordinarily short-sighted behavior. Finally, when it comes to altruism, many people have moments in which they display extreme selflessness and other moments in which they appear selfish or

even destructive toward others. Again, how they behave is likely to depend critically on situational more than dispositional factors. Risk taking, time discounting, and interpersonal decision making, it seems, are much more a function of how people construe situations than of how they evaluate and weigh attributes (Ross and Nisbett 1991).

Decision-Making Anomalies

Behavioral decision researchers are masters at discovering anomalous patterns of behavior that violate the predictions of models such as expected utility theory and discounted utility theory (Loewenstein 1996b). But we are not always quite as skilled at coming up with compelling explanations for these anomalies. To the degree that behavioral models, like traditional models, cannot account for such anomalies, they constitute anomalies not only for rational choice theories but for behavioral theories as well.

An example of an anomaly in search of an explanation is the preference for sequences of outcomes that improve over time. Contrary to the assumption that delayed rewards are discounted, people often prefer improving over deteriorating sequences of outcomes. In one demonstration of this effect, Drazen Prelec and I (Loewenstein and Prelec 1993) asked some subjects to choose whether they would eat a fancy French restaurant dinner in one month or two, and we asked others to choose between one sequence (fancy French this month, mediocre Greek next month) and the same dinners in reverse order. A majority of subjects preferred the isolated French dinner earlier but deferred the French dinner when it was embedded in a sequence with the Greek dinner. We proposed two mechanisms to account for this effect: that people derive utility from anticipation and leave the best for last so they can “savor” it and that earlier consumption creates a positive contrast that enhances the desirability of later consumption. However, explicit tests of these mechanisms have not generally been supportive. For example, Shane Frederick and I (Frederick and Loewenstein 2000) conducted a study in which we encouraged some subjects to think explicitly about utility from anticipation before choosing between sequences, but this had little impact on the preference for improvement.

Our current thinking is that people have a choice heuristic that favors improvement over decline. People do not always seek out improvement but do so only when the issue of improvement is highlighted by the way that a decision they are faced with is framed. The Greek-then-French versus French-then-Greek choice strongly evokes the issue of improvement versus decline, but the choice of when to consume the lone French dinner does not. In further research, Frederick and I (Frederick and Loewenstein 2000) gave people sequence choices using alternative formats that were intended to highlight different considerations, and we obtained results consistent with the idea that question format can affect how people construe the choice. For example, in one version we asked respondents to allocate pleasurable outcomes such as massages over time. We expected, and found, that the allocation format would evoke a “choice

heuristic" that would cause people to spread consumption relatively evenly over time, implying a preference for flat sequences. In another version, we asked respondents to state a maximum buying price for the Greek-then-French and French-then-Greek sequences rather than choose between them. We expected this method of elicitation to evoke considerations of the time value of money and, hence, to shift subjects toward a preference for declining sequences, which is what we found.

Another phenomenon that is difficult to explain in consequentialist terms is the "diversification bias" (Simonson 1989). When people choose several alternatives from a set, they opt for more variety when they choose them all simultaneously than when they choose them sequentially. This phenomenon is robust and apparently quite general, with demonstrations in such domains as snack food, audio pieces, gambles, and lottery tickets. In a series of studies, Daniel Read and I (Read and Loewenstein 1995) tested a wide range of potential explanations for this bias, including the possibilities that subjects overdiversified in simultaneous choice to obtain information about the available options, that they overpredicted how much variety they would like to consume, or that they mentally contracted the interconsumption interval, choosing for consumption separated by one week as if it was separated by a few minutes. None of these hypotheses were borne out. For example, if information-seeking could explain the effect, we would expect subjects who received "free samples" of all the items to diversify less. They did not. Moreover, if they expected to like more variety than they did, we would expect them to show diversification in predictions of future choices, as well as in choices made for the future, but in fact they did not. Recently, Read et al. (2001) showed that time contraction also cannot explain diversification bias. When subjects choose for consecutive consumption (i.e., when the interconsumption interval is as small as it can be), there is still much more variety seeking in simultaneous than in sequential choice. It appears that no attribute-based explanation can account for the data and that people are choosing based on a diversification heuristic (e.g., "variety is the spice of life"), a rule of thumb that they apply whenever choices are expressed in a fashion that highlights diversification. This viewpoint is supported by a study (Read, Loewenstein, and Kalyanaraman 1999) in which subjects made successive choices between groups of objects for which there either was or was not a simple, salient categorization. When there was a simple categorization (e.g., virtues and vices), subjects diversified more in simultaneous than in sequential choice, but when there were multiple competing categorizations, the difference between choice modes disappeared. In short, research into the diversification bias shows no evidence of consequentialist reasoning but, rather, points to a choice rule that is applied when it seems relevant.

Problems with Evaluating Consequences

The standard decision-making approach assumes that we know what we want. This assumption has been challenged

by a broad range of research on "preference uncertainty" (Slovic 1995). Dan Ariely, Drazen Prelec, and I recently conducted a series of studies that documented a particularly dramatic form of preference uncertainty. In what we dubbed the "Tom Sawyer Study" (Ariely, Prelec, and Loewenstein 2001), we asked some subjects if they would be willing to listen to 10 minutes of Walt Whitman's *Leaves of Grass* if we paid them \$10, and we asked others if they would pay \$10 for the same experience. Using a truthful elicitation procedure, we then obtained subjects' bids (which could be positive or negative) for listening to *Leaves of Grass* for one, five, or 10 minutes. Subjects' values were powerfully influenced by the random anchor. Those asked if they would pay were willing to pay to listen to the poetry, and those asked if they would listen if they were paid needed to be paid to do it. Whether they valued the experience positively or negatively, however, they named higher money amounts for longer durations of poetry. Participants had no idea whether this was a positive or negative experience, but they knew that it was more positive or negative if it was longer.

The same difficulty in evaluating experiences can be observed not only in the laboratory but in daily life. Many, if not most, experiences are ambiguously pleasurable. For example, mountaineering, skiing, having children, taking a trip to Disneyland, having an affair, or smoking marijuana each has positive and negative aspects, and the overall experience is likely to include both intense highs and lows. Whether one evaluates the experience as pleasurable or miserable will depend very much on one's construal of the activity (see Schwarz and Strack 1999).

Perverse Effects of Deliberation

If decision making is a matter of connecting actions to consequences and then decomposing consequences into attributes, as conventional theories of decision making assume, then encouraging people to carry out these operations in a more careful or systematic fashion should improve the quality of decision making. However, there is little evidence that it does so. Klein (1989, p. 79), for example, notes that "decision aids, to support the use of Decision Analysis and Multiattribute Utility Analysis, do not seem to have been well accepted in operational settings. With a few exceptions, decision training has not been shown to be very effective, and under time pressure such training has not shown any benefit." Research by Wilson and his colleagues (Wilson et al. 1993; Wilson and Schooler 1991) shows that thinking explicitly about one's reasons for preferring a particular choice object can sometimes reduce the quality of decision making. For example, in one study in which college students selected their favorite poster from among a set (Wilson et al. 1993), those asked to provide reasons why they liked or disliked different posters ended up less happy with their choice and less likely to keep it on display than were those who were not asked to provide reasons. Wilson and his colleagues concluded that thinking of reasons interferes with people's ability to access "gut" level reactions that play an important role in spontaneous decision making.

FEATURES OF AN ALTERNATIVE PERSPECTIVE

If people do not choose between alternative courses of behavior by explicitly weighing their costs and benefits, what alternative perspective can account for behavior? Perhaps, as Weber, Blais, and Tada (1998) advocate persuasively, no one theory is correct; decision makers utilize multiple “modes of decision making,” such as decision based on reasons, affect, cost-benefit calculation, and so on. The major challenge for decision researchers, they argue, is to explain the determinants of decision modes, such as decision domain, and the decision maker’s motivation and cultural background (Weber et al. 1998). While this account seems highly plausible, the tasks of modeling each of these different modes of decision making, and of predicting which mode will come into play in different situations, seems daunting.

While I have nothing more concrete to offer, it may be worth speculating about the broad outlines of a more unitary account of behavior that would take into account the various phenomena discussed in the preceding section of this article.

First, such an account of behavior should not exaggerate the role of consciousness. Rather than actually guiding or controlling behavior, consciousness seems mainly to make sense of behavior after it is executed.

Second, and consistent with bounded rationality, such an account of behavior should assume that people rely on cognitive capabilities that are relatively well developed, such as visual perception and object recognition, rather than operations that they are not very good at, like addition and multiplication.

Third, the impact of context also suggests that processes such as pattern matching and categorization may be important. People do not seem to have all-purpose algorithms for deciding how to behave. Instead, they often seem to behave according to a two-stage process in which they first attempt to figure out what kind of situation they are in and then adopt choice rules that seem appropriate for that situation.

If people conform to rules of behavior based on the situation that they believe themselves to be in, then behavior will be relatively insensitive to normatively important factors as long as a person’s construal of the situation remains unchanged; behavior will change abruptly and radically when the individual’s construal of the situation she is in does change. Such a change in construal may help to explain Greenspan’s observations in the epigraph to this article. If people’s construal of the market changes suddenly from “boom” to “crash,” then, as Greenspan notes, “there may not be a seamless transition from high to moderate to low confidence on the part of businesses, investors, and consumers.” The discontinuity of construals may also help to explain why, for example, paying people a small amount to donate blood actually seemed to decrease blood donations (Titmuss 1970, 1987) or why charging parents a small amount for picking up their children late at the day-care center can actually increase late pickups (Gneezy and Rustichini, forthcoming).

Giving blood for free or picking one’s child up on time are both socially desirable actions; introducing any money payment transforms it into a market transaction, at which point people are likely to ask themselves whether it is worth the money.

The twin concepts of situational construal and choice rules may also help to shed light on the form taken by much advertising. While conventional models of decision making can make sense of advertisements that provide information about products (whether informative or misleading), much advertising—for example, depicting happy, attractive friends drinking Coca-Cola—seems to have little informational content. Instead, such advertising seems to be intended to create mental associations that operate in both directions, causing one to think that one should be drinking Coca-Cola if one is with friends (by invoking a choice heuristic) and to infer that one must be having fun if one is drinking Coca-Cola (playing on the difficulty of evaluating one’s own hedonic state).

Fourth, the prevalence of intraindividual variability suggests that we need to search in new areas for the sources of intraindividual differences. In the domain of risky decision making, for example, we should be studying individual differences in what types of activities people perceive as risky (Weber and Milliman 1997). Again, how an individual construes a situation seems to be key.

Fifth, rather than looking for attribute-based explanations for decision-making anomalies, such as the preference for improvement and prospective variety seeking, perhaps we should be attempting to identify the repertoire of choice heuristics that people utilize and to understand the types of cues that trigger specific heuristics.

Sixth, given the difficulty that people have in evaluating the desirability of outcomes or even their own immediate happiness, we should steer away from theories that assume that they do so. The normative analog to this argument is that we should also move away from the idea that the key to enhancing people’s happiness is to give them more of what they want. Research on happiness shows that, with a few major exceptions like being unemployed or having a child with problems, happiness is only weakly related to one’s objective circumstances. However, there do seem to be important individual differences in how people perceive the world. Certain people seem to construe the world “with rose-colored glasses.” They are the ones who enjoy the spectacular vistas when mountaineering (and ignore its miseries), derive exhilaration from the speed of skiing (and ignore the prices and lift lines), decide that carpooling children is their life’s calling, and presume that the miseries of Disneyland are well compensated for by its pleasures. Of course, one would want to be wary of using such an argument to support an unfair or inequitable distribution of social resources on the grounds that those who are disadvantaged should simply put themselves into the right frame of mind.

While these six critiques of the standard account of decision making do not add up to a well-defined alternative perspective, two important themes can be discerned: (1) the importance of people’s subjective construals of their situations and

(2) the role played by choice rules or heuristics. Each of these features already plays a role in accounts of behavior proposed by decision researchers. For example, there are a number of theories that point to the importance of pattern matching and construal in behavior. Gilboa and Schmeidler's (1995) "case-based" decision theory posits that people make decisions by judging the similarity of the current situation to past situations and by applying decision rules that produced desirable results in similar situations in the past (other recent pattern-matching models proposed by economists include Jehiel [2001], Lam [2000], and Mullainathan [2000]). Beach and Mitchell's (1987, 1990) "image theory," Klein's (1989) account of "recognition-primed decisions," and Wright and Heath's (2000) notion of "identity-based choice" are further examples of what could be called "category-based decision making." There are also a number of important discussions of the role of choice heuristics. Prelec (1991, p. 133), for example, in an insightful article titled "Values and Principles," draws a distinction between "action governed by cost-benefit calculation—however broadly the relevant costs and benefits are understood—and action governed by a binding rule or principle." The key step, in my opinion, will be to integrate these elements and to formalize them in a fashion that produces concrete, testable predictions.

CLOSING COMMENT

The late economist Joseph Schumpeter coined the term "creative destruction" to describe the relentless impetus of technologically driven economic progress. It seems to me that this term applies well to the field of behavioral decision research. Decision research is currently in ferment, the most intellectually vibrant period that I have witnessed since joining the field in the mid-1980s. But the most exciting ideas sweeping the field seem almost antithetical to the notion of decision making itself. Assessing the situation that one is in and applying rules that apply to that situation does not look much like decision making as it is typically construed. Decision research may be in a process of remaking itself or, possibly, rendering itself obsolete.

[David Glen Mick served as editor for this article.]

REFERENCES

- Anderson, John R. (1993), *Rules of the Mind*, Hillsdale, NJ: Erlbaum.
- Ariely, Dan, Drazen Prelec, and George F. Loewenstein (2001), "Coherent Arbitrariness: Stable Demand Curves without Stable Preferences," working paper, Sloan School of Management, Massachusetts Institute of Technology, Cambridge 02142.
- Bargh, John A. and Tanya L. Chartrand (1999), "The Unbearable Automaticity of Being," *American Psychologist*, 54 (July), 462–479.
- Bargh, John A. and Peter M. Gollwitzer (1994), "Environmental Control of Goal-Directed Action: Automatic and Strategic Contingencies between Situations and Behavior," in *Integrative Views of Motivation, Cognition, and Emotion*, ed. William D. Spaulding, Lincoln: University of Nebraska Press, 71–124.
- Beach, Lee R. and Terence R. Mitchell (1987), "Image Theory: Principles, Plans, and Goals in Decision Making," *Acta Psychologica*, 66 (December), 201–220.
- (1990), "Image Theory: A Behavioral Theory of Decisions in Organizations," in *Research in Organizational Behavior*, Vol. 12, ed. Barry M. Staw and Larry L. Cummings, Greenwich, CT: JAI.
- Bem, Daryl J. (1967), "Self-Perception: An Alternative Interpretation of Cognitive Dissonance Phenomena," *Psychological Review*, 74 (3), 183–200.
- Blount, Sally and Margaret A. Neale (1994), "The Role of Negotiator Aspirations and Settlement Expectancies in Bargaining Outcomes," *Organizational Behavior and Human Decision Processes*, 57 (February), 303–317.
- Calvin, William H. (1996), *How Brains Think: Evolving Intelligence, Then and Now*, New York: Basic.
- Camerer, Colin F. and Richard H. Thaler (1995), "Ultimatums, Dictators and Manners," *Journal of Economic Perspectives*, 9 (Spring), 209–219.
- Frederick, Shane and George F. Loewenstein (2000), "The Psychology of Sequence Preferences," working paper, Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh 15213.
- Frederick, Shane, George F. Loewenstein, and Ted O'Donoghue (2001), "Time Discounting: A Critical Review," working paper, Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh 15213.
- Fuchs, Victor (1982), "Time Preferences and Health: An Exploratory Study," in *Economic Aspects of Health*, ed. Victor Fuchs, Chicago: University of Chicago Press, 93–120.
- Gabaix, Xavier and David I. Laibson (2000), "A Boundedly Rational Decision Algorithm," *American Economic Review*, 90 (May), 433–438.
- Gazzaniga, Michael S. and Joseph E. LeDoux (1978), *The Integrated Mind*, New York: Plenum.
- Gilboa, Itzhak and David Schmeidler (1995), "Case-Based Decision Theory," *Quarterly Journal of Economics*, 110 (August), 605–639.
- Gneezy, Uri and Aldo Rustichini (forthcoming), "Incentives, Punishment and Behavior," in *Readings in Behavioral Economics*, ed. Colin F. Camerer et al., New York: Sage.
- Gobet, Fernand and Herbert A. Simon (1996), "Recall of Random and Distorted Chess Positions: Implications for the Theory of Expertise," *Memory and Cognition*, 24 (July), 493–503.
- Goldstein, William M. and Elke U. Weber (1995), "Content and Its Discontents: The Use of Knowledge in Decision Making," in *Decision Making from a Cognitive Perspective: The Psychology of Learning and Motivation*, Vol. 32, ed. Jerome R. Busemeyer et al., New York: Academic Press, 83–136.
- Haier, Richard, Benjamin V. Siegel, Andrew MacLachlan, Eric Soderling, et al. (1992), "Regional Glucose Metabolic Changes after Learning a Complex Visuospatial Motor: Task A Positron Emission Tomographic Study," *Brain Research*, 570 (January), 134–143.
- Hershey, John C., Howard C. Kunreuther, and Paul J. H. Schoemaker (1982) "Sources of Bias in Assessment Procedures for Utility Functions," *Management Science*, 28 (August), 936–945.
- Jehiel, Philippe (2001), "Analogy-Based Expectation Equilibrium," Working Paper No. 3, School of Social Science, Institute for Advanced Study, Princeton, NJ 08540.

- Klein, Gary A. (1989), "Recognition-Primed Decisions," *Advances in Man-Machine Systems Research*, 5, 47–92.
- Lam, Ricky (2000), "Learning through Stories," unpublished manuscript, Economics Department, Yale University, New Haven, CT.
- Langer, Ellen J. (1989), "Minding Matters: The Consequences of Mindlessness-Mindfulness," in *Advances in Experimental Social Psychology*, Vol. 22, ed. Leonard Berkowitz, San Diego, CA: Academic Press, 137–173.
- Loewenstein, George (1996a), "Behavioral Decision Theory and Business Ethics: Skewed Tradeoffs between Self and Other," in *Codes of Conduct: Behavioral Research into Business Ethics*, ed. David Messick and Ann E. Tenbrunsel, New York: Sage, 214–226.
- (1996b), "Richard Thaler: The Master of Anomaly," in *American Economists of the Late Twentieth Century*, ed. Warren J. Samuels, Cheltenham, UK: Elgar, 351–362.
- Loewenstein, George and Drazen Prelec (1993) "Preferences for Sequences of Outcomes," *Psychological Review*, 100 (January), 91–108.
- Loewenstein, George, Elke U. Weber, Christopher K. Hsee, and Ned Welch (2001), "Risk as Feelings," *Psychological Bulletin*, 127 (March), 267–286.
- Louis, Meryl R. and Robert I. Sutton (1991), "Switching Cognitive Gears: From Habits of Mind to Active Thinking," *Human Relations*, 44 (January), 55–76.
- MacCrimmon, Kenneth R. and Donald A. Wehrung (1990), "Characteristics of Risk Taking Executives," *Management Science*, 36 (April), 422–435.
- Mullainathan, Sendhil (2000), "Thinking through Categories," unpublished manuscript, Department of Economics, Massachusetts Institute of Technology, Cambridge 02142.
- Nisbett, Richard E. and Timothy D. Wilson (1977), "Telling More than We Can Know: Verbal Reports on Mental Processes," *Psychological Bulletin*, 84 (March), 231–259.
- Payne, John W., James R. Bettman, and Erick J. Johnson (1993), *The Adaptive Decision Maker*, Cambridge: Cambridge University Press.
- Prelec, Drazen (1991), "Values and Principles: Some Limitations on Traditional Economic Analysis," in *Socioeconomics: Toward a New Synthesis*, ed. Amitai Etzioni and Paul R. Lawrence, New York: Sharpe.
- Prelec, Drazen and Richard Herrnstein (1991), "Preferences and Principles, Alternative Guidelines for Choice," in *Strategic Reflections on Human Behavior*, ed. Richard Zeckhauser, Cambridge, MA: MIT Press.
- Read, Daniel, Gerrit Antonides, Laura Van den Ouden, and Harry Trienekens (2001), "Which Is Better? Simultaneous or Sequential Choice?" *Organizational Behavior and Human Decision Processes*, 84 (January), 54–70.
- Read, Daniel and George Loewenstein (1995), "Diversification Bias: Explaining the Discrepancy in Variety Seeking between Combined and Separated Choices," *Journal of Experimental Psychology: Applied*, 1 (March), 34–49.
- Read, Daniel, George F. Loewenstein, and Shobana Kalyanaraman (1999), "Mixing Virtue and Vice: Combining the Immediacy Effect and the Diversification Heuristic," *Journal of Behavioral Decision Making*, 12 (December), 257–273.
- Ronis, David L., J. Frank Yates, and John P. Kirscht (1989), "Attitudes, Decisions, and Habits as Determinants of Repeated Behavior," in *Attitude Structure and Function*, ed. Anthony R. Pratkanis et al., Hillsdale, NJ: Erlbaum, 213–239.
- Ross, Lee and Richard E. Nisbett (1991), *The Person and the Situation: Perspectives of Social Psychology*, Philadelphia: Temple University Press.
- Ross, Lee and Andrew Ward (1996), "Naive Realism in Everyday Life: Implications for Social Conflict and Misunderstanding," in *Values and Knowledge*, ed. Edward S. Reed et al., Mahwah, NJ: Erlbaum, 103–135.
- Schneider, Walter and Richard M. Shiffrin (1977), "Controlled and Automatic Human Information Processing. I. Detection, Search and Attention," *Psychological Review*, 84 (January), 1–66.
- Schwarz, Norbert and Fritz Strack (1999), "Reports of Subjective Well-Being: Judgmental Processes and Their Methodological Implications," in *Well-Being: The Foundations of Hedonic Psychology*, ed. Daniel Kahneman et al., New York: Russell Sage, 61–84.
- Shiffrin, Richard M. and Walter Schneider (1977), "Controlled and Automatic Human Information Processing. II. Perceptual Learning, Automatic Attending and a General Theory," *Psychological Review*, 84 (March), 127–190.
- Simon, Herbert A. (1955), "A Behavioral Model of Rational Choice," *Quarterly Journal of Economics*, 69, 99–118.
- Simonson, Itamar (1989), "Choice Based on Reasons: The Case of Attraction and Compromise Effects," *Journal of Consumer Research*, 16 (September), 158–174.
- Slovic, Paul (1995), "The Construction of Preferences," *American Psychologist*, 50 (May), 364–371.
- Titmuss, Richard M. (1970), *The Gift Relationship*, London: Allen & Unwin.
- (1987), "The Gift of Blood," in *The Philosophy of Welfare, Selected Writings by R. M. Titmuss*, ed. Brian Abel-Smith and Kathleen Titmuss, London: Allen & Unwin.
- Weber, Elke U., Ann-Renee Blais, and Yuri Tada (1998), "From Shakespeare to Spielberg: Predicting Selection among Modes of Decision Making," paper presented at the expanded version of the presidential address by Elke Weber, delivered at 1998 annual meeting of the Society for Judgment and Decision Making, Dallas.
- Weber, Elke U. and Richard A. Milliman (1997), "Perceived-Risk Attitudes: Relating Risk Perception to Risky Choice," *Management Science*, 43 (February), 123–144.
- Wegner, Daniel M and Thalia Wheatley (1999), "Apparent Mental Causation: Sources of the Experience of Will," *American Psychologist*, 54 (July), 480–492.
- Wilson, Timothy D., Douglas J. Lisle, Jonathan W. Schooler, Sara D. Hodges, Kristen J. Klaaren, and Suzanne J. LaFleur (1993), "Introspecting about Reasons Can Reduce Post-choice Satisfaction," *Personality and Social Psychology Bulletin*, 19 (June), 331–339.
- Wilson, Timothy D. and Jonathan W. Schooler (1991), "Thinking Too Much: Introspection Can Reduce the Quality of Preferences and Decisions," *Journal of Personality and Social Psychology*, 60 (February), 181–192.
- Wright, John and Chip Heath (2000), "Identity-Based Choice: Who I Am Determines What I Choose," paper presented at the annual meeting of the Society for Judgment and Decision Making, New Orleans.